

# Portslade

## South Street flood prevention scheme

by  
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**F**looding, caused by the combined drainage and sewerage system which serves large parts of Portslade, in Sussex, where a single ageing pipe has to cope with both sewage and rainwater has caused problems for some residents every year for the last 20 years. Much of the network was designed to meet the needs of a sparse rural population when Victoria was on the throne, but today, Portslade is a congested urban village and part of the thriving city of Brighton & Hove. Eventually, the system could no longer cope with the growing demands placed upon it, caused partly by severe storms which are becoming more frequent due to climate change. Southern Water's solution was to increase the capacity of the network by upsizing the combined sewer in South Street, in the centre of the village, and installing two large storage tanks beneath the local car park. These can store up to one million litres of stormwater and sewage until violent storms subside.



Portslade: Flooding

*photo courtesy of a local resident*

### Location

The Portslade catchment is located on the border of East and West Sussex, approximately 7km west of Brighton and to the East of the River Adur. It contains a developed area of around 12 km<sup>2</sup> with a population of around 55,000. The catchment contains a mixture of mainly residential areas and light industrial units with some heavy industry towards the south covering the urban areas of Shoreham and Portslade.

The sewer system contains a mixture of combined sewers in the older areas, partially separate, and fully separate systems. The sewers flow predominantly north to south towards a new wastewater treatment plant in the south of the catchment.

There are 13 properties in South Street and High Street in Portslade village that suffer from internal and external foul and surface water flooding. Portslade village is one of the oldest parts of the catchment drained mainly by Victorian sewers. High Street and South Street are located in a low steep sided valley. The local sewers receive flows from catchments on the three steep hills and flooding occurs during storm conditions

### South Street

Residents of the properties have experienced flooding since at least 1988. All of the properties are protected from internal flooding by Anti-Flooding Devices (AFDs). However, after heavy rain, foul and surface water highway flooding occurs to a depth that can enter



The lid to the storm tank being delivered *courtesy of Connors*

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Portslade: Upsizing the sewer in South Street

*courtesy of Connors*

properties. Some property owners have developed their own flood mitigation measures, adapting the levels of doors, building walls and adding flood boards to reduce the risk of further disruption.

**Southern Water is carrying out £1.8 billion of capital scheme between 2005 and 2010. 4Delivery has been contracted to deliver more than 250 of these projects, one of which was to reduce the risk of flooding in Portslade.**

4D was issued with a brief to do all works necessary to resolve internal, garden and highway flooding at 13 properties in South Street and High Street Portslade. The scheme was to resolve flooding from both foul and surface water sewer systems. The regulatory driver was to remove 13 properties from the 1 in 10 years DG5 flooding register.

The DG5 flooding register is one of the level of service indicators used by Ofwat, the regulator for the water and sewerage industry in England & Wales, to measure the performance of water companies and to define an Overall Performance Assessment (OPA). This allows both OFWAT and customers to compare how water companies are performing against industry averages. The OPA can also affect whether companies are rewarded or penalised when price limits are reviewed.

Around £1 billion is being spent by water companies to resolve sewer flooding over the AMP4 period. **Funding for this project was determined by Ofwat, who control Southern Water's ability to generate revenue from bills. The budget for this scheme was £2.03 million as defined in Southern Water's AMP4 business plan.**

#### Finding a solution

The 4D Modelling Methodology identifies 3 tiers of potential solutions to consider when developing solutions to flooding. Using the model results, it was established that many of the potential solutions listed would not be effective, economically feasible or sustainable at this location.

**It was identified that a local pipe upsizing and online storage culverts would be an effective solution. This also involved the least environmental disruption, involving local changes to pipes and local storage provision.**

#### Design

The initial design developed for on-line detention tanks filling and emptying by gravity progressed as the preferred solution. The tanks were to use pre-cast elements for the walls and roof slab to minimise the construction period on site. However, at the Value Engineering meeting, the Construction team determined that off line storage in vertical shafts, with pumped return would be a more economic form of construction. The switch would also reduce the risk to adjacent walls and properties through vibration during construction.

The hydraulic model was run for a series of 30 year design storms to assess the amount of storage required. This revealed storage tank sizing of 530m<sup>3</sup> and 330m<sup>3</sup> were required on the combined and surface water tanks respectively. The solution was refined using model iterations with changes to weir and pipe levels to ensure no significant detriment was caused in the sewer network. This scheme also involved approximately 200 service crossings in the South Street and High Street areas. A number of changes were required to the pipe layout due to site constraints.

#### Construction

The scheme involved approximately 205m of pipe upsizing, 200m of new pipework and twin 10m and 15m deep storage tanks (7.5m and 6m diameter) Nearly 350m of new surface water sewer have been laid, plus 25m of combined sewer.

The flow detention tanks are designed to be unmanned. Once constructed, the cleaning system in the combined sewage tank is intended to operate automatically with minimal manual intervention.

#### The above ground works comprise:

- \* single kiosk constructed from GRP and coloured dark green;
- \* 4.0m high vent column provided at eastern side of car park;
- \* flows from the surface water & sewage catchments arrive at the flow diversion chambers in new gravity sewers. Excess storm flows are spilled via high level weirs into the adjacent



Storage tank location, off High Street *courtesy of 4Delivery*

- underground detention tanks;
- \* the underground tank on the surface water system is 6.0m dia. and approximately 10m deep;
- \* the underground tank on the combined sewer system is 7.5m dia. and approximately 15m deep;
- \* two pumps operating as duty, standby are provided in each tank to return diverted flows to the sewer system on cessation of a storm;
- \* a single pump is provided in the combined sewer tank to operate the automatic cleaning system;
- \* access to the tanks is through removable covers at ground level, there will be no provision for permanent lifting frames or cranes. It is expected that lifting of the pumps will be carried out using portable davits temporarily fitted into sockets at the time maintenance work is undertaken.

**Completion of the scheme was successfully achieved on programme before the contract takeover date of 31st March 2007. ■**

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